

## **REMARKS**

Claims 1-9, 20, and 22-26 remain in this application. No changes to the claims have been made in this response.

### Claim Rejections under 35 U.S.C. 102(b):

Claims 1, 3-8, and 20-26 were rejected under 35 U.S.C. 102(b) as being anticipated by Quek et al. (US 6,252,290) (hereinafter “Quek”).

No proper *prima facie* rejection of claim 1 has been presented; the rejection is unsupported in the art and should be removed. A proper *prima facie* rejection requires that Quek disclose each limitation in claim 1. Claim 1 recites that substantially all the patterned first via dielectric layer remains in place after decomposing the photosensitive trench dielectric layer. Quek, in contrast, discloses removing portions of layer 12 (characterized by the Examiner as layer 12) not masked by a passivation layer (*see*, Quek, Figure 6, col. 5 lines 54-63). Those portions of layer 12 removed in Quek are clearly substantial portions of the layer (*see*, Quek, Figure 6). Therefore, Quek does not disclose that substantially all of the patterned first dielectric layer remains in place. As Quek fails to disclose each claim limitation, the rejection should be withdrawn.

The Examiner’s response to Applicants’ prior arguments does not overcome the fact that Quek fails to disclose that substantially all the patterned first via dielectric layer remains in place after decomposing the photosensitive trench dielectric layer. The Examiner states on page 4 of the Office Action that “a substantial amount of the patterned first via dielectric

remains.” Such a statement ignores the language of claim 1, specifically the word “all”.

Claim 1 states that, “substantially **all** the patterned first via dielectric layer remains” (emphasis added). As stated above, Quek clearly discloses (*see*, Quek, Figure 6) that substantial parts of layer 12 are removed. Portions of layer 12 not masked by the passivation layer are stripped and removed. Thus, because substantial portions of layer 12 have been removed, it cannot be said that substantially **all** of layer 12 remains.

To highlight the difference between “a substantial amount remaining” (Examiner’s characterization of Quek) and “substantially **all** remaining” (claim 1) consider a chocolate-chip cookie that belongs to a child. The child is selfish and wants to eat substantially all the cookie (they may perhaps be willing to give me a crumb). If I eat half the cookie, a substantial portion (one-half) of the cookie still remains. However, the child would be very upset and probably scream quite loudly because substantially all the cookie does not remain. I would be lying (in addition to being mean) if I told the child to stop crying because substantially all the cookie remains. A substantial portion does not equal substantially all.

Claims 3-8, 25, and 26 depend from claim 1. For the reasons presented above, these rejections are unsupported in the art and should be removed.

The rejection of claim 20 is unsupported in the art and should be removed. Quek fails to disclose that decomposing the first photosensitive trench dielectric layer occurs (a) without removing the second via dielectric layer over at least some decomposed portions of the first photosensitive trench dielectric layer and (b) without removing the first via dielectric layer under at least some decomposed portions of the first photosensitive trench dielectric layer, as is recited in claim 20. Claim 20 recites that some of the second via dielectric layer remains in place over a decomposed portion of the first photosensitive trench dielectric layer. Claim 20 also recites that some of the first via dielectric layer remains under a decomposed

portion of the first photosensitive trench dielectric layer. Figure 11 and paragraph [0030] of the Specification describes such an arrangement, with layers 108 (on top the decomposed portion) and 104 (beneath the decomposed portion) remaining in place after trench material 402 is decomposed beneath. Quek discloses no such arrangement. Quek only discloses removing **all three** of the via dielectric layer, the trench dielectric layer, and the top layer to form a vertical air gap in the entire volume formerly occupied by all three layers (*see*, Quek, Figure 6, col. 5 lines 54-63). Neither portion of the layers above or below layer 12 remains in place. Thus, Quek fails to disclose all limitations recited in claim 20 and the rejection should be withdrawn.

Further, the office action mailed June 22, 2006 fails to set forth a *prima facie* rejection of claim 20. The rejection in that office action fails to address each limitation of claim 20. Specifically, the rejection does not address the limitation that the decomposition of the first photosensitive trench dielectric layer occurs without removing the second via dielectric layer over at least some decomposed portions. Nor does the rejection address the limitation that the decomposition of the first photosensitive trench dielectric layer occurs without removing the first via dielectric layer under at least some decomposed portions. As no *prima facie* rejection of claim 20 has been made, the rejection should be withdrawn.

Claims 22-23 depend from claim 20. The rejections of claims 22-23 should be withdrawn for the reasons provided above.

Additional reasons rejections should be withdrawn for selected claims are presented below. Applicants note that the office actions dated June 22, 2006 and December 30, 2005 do not include any discussion of the limitations addressed below, or any indication of where in the reference any disclosure of the limitations can be found. Applicants believe that this is because the cited reference does not disclose the limitations addressed below.

Quek fails to disclose substantially completely decomposing the photosensitive trench dielectric layer, as is recited in claim 5. The Examiner failed to address this limitation in rejecting the claim. However, in the rejection of claim 1, the Examiner characterized layer 14 of Quek as the trench dielectric layer. As seen in Figure 6 of Quek, any portion of layer 14 that is under passivation layer 42 remains in place. Thus, Quek does not disclose substantially completely decomposing layer 14. The rejection is unsupported in the art and should be withdrawn.

Quek fails to disclose a photosensitive trench dielectric layer comprised of a matrix material and a porogen material, where decomposing the photosensitive trench dielectric layer comprises removing at least some of the porogen material from the matrix material, leaving a porous trench dielectric layer between the first via dielectric layer and the top layer, as is recited in claim 7. Rather, Quek discloses completely removing sections of the trench dielectric layer. The Examiner has not addressed this claim limitation, or made any presentation of where Quek discloses such a porous trench dielectric layer. Applicants can not find any such disclosure, and believe it to not be present within Quek. As no shred of evidence of Quek disclosing this limitation has been set forth, Applicants believe the rejection is unsupported in the art and should be withdrawn.

Quek fails to disclose that portions of the second via dielectric layer remain between air gaps resulting from decomposition of portions of the first and second trench dielectric layers, as is recited in claim 24. The Examiner failed to address this claim limitation with any specificity in rejecting the claim. As seen in Figure 6 of Quek, and as described at col. 5, line 54 through col. 6, line 5, all trench and via dielectric layer exposed by removal of passivation layer 42 of Quek are removed in a continuous vertical trench. Thus, Quek does

not disclose any arrangement where a portion of a layer remains but layer portions above and below it have been removed to form air gaps.

Quek fails to disclose that the first via dielectric layer comprises a material that is not photosensitive, as is recited in claim 25. The Examiner characterized layer 12 of Quek as the first via dielectric layer. Quek discloses that layer 12 is a photosensitive material (Quek, col. 3, lines 57-67), which is opposite to the recited limitation. The rejection is unsupported in the art and should be withdrawn.

Quek fails to disclose that decomposed material from the photosensitive trench dielectric layer passing through top layer comprises diffusion through portions of the top layer that have not been removed, as is recited in claim 26. As seen in Figure 6 of Quek, and as described at col. 5, line 54 through col. 6, line 5, all trench and via dielectric layer exposed by removal of passivation layer 42 of Quek are removed in a continuous vertical trench. Thus, there is no disclosure of decomposed material diffusing through portions of a top layer that have not been removed. The rejection is unsupported in the art and should be withdrawn.

Claim Rejections under 35 U.S.C. 103(a):

Claims 2 and 9 were rejected under 35 U.S.C. 103(a) as being unpatentable over Quek.

Claims 2 and 9 depend from claim 1. As Quek does not disclose or suggest the limitations recited in claim 1, it does not then disclose or suggest all limitations of claims 2 or 9. The rejections are unsupported in the art and should be withdrawn.

Respectfully submitted,

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